

# **Spot Safety Project Evaluation**

Project Log # 200505109

Spot Safety Project # 08-95-220

**Spot Safety Project Evaluation of the Standard Flasher and Left Turn Lanes Installation at the Intersection of SR 1001 (Lemon Springs Rd) and SR 1146 (St. Andrew's Church Rd) in Lee Co.**

Documents Prepared By:

Safety Evaluation Group  
Traffic Safety Systems Management Section  
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North Carolina Department of Transportation

**Principal Investigator**

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Traffic Safety Project Engineer

7/6/06  
Date

## ***Spot Safety Project Evaluation Documentation***

### **Subject Location**

Evaluation of Spot Safety Project Number 08-95-220 - Flasher and Left Turn Lanes Installation at the Intersection of SR 1001 (Lemon Springs Rd) and SR 1146 (St. Andrew's Church Rd) in Lee County.

### **Project Information and Background from the Project File Folder**

SR 1001 was a 55 mph, two lane facility without left turn lanes in the before period. SR 1146 is a 45 mph, two-lane facility without left turn lanes. The intersection was controlled by stop signs on SR 1146 with stop ahead signs and pavement markings at both approaches. Advance crossroad warning signs are at both approaches on SR 1001.

The original problem statement was that a vertical crest north of the intersection resulted in rear end type collisions when vehicles slowed to make a turn onto SR 1146 and angle type collisions when vehicles pulled into the intersection from SR 1146. The spot safety project improvement countermeasure chosen for the subject location was the installation of a standard flasher and left turn lanes on SR 1001. The initial crash analysis was completed from 6/1/1991 through 5/31/1995 with 15 reported crashes. The final completion date for the standard flasher installation at the subject intersection was on January 12, 2000 at a cost of \$100,000.

### **Naive Before and After Analysis**

After reviewing the spot safety project file folder along with all the crashes along the subject road, the crash data omitted from this analysis to consider for an adequate construction period was from December 1999 to February 2000. The before period consisted of reported crashes from February 1, 1994 through November 30, 1999 (5 years, 10 Months) and the after period consisted of reported crashes from March 1, 2000 through December 31, 2005 (5 Years, 10 Months). The ending date for this analysis was determined by the available crash data at the time the crash analysis was completed.

The treatment data consisted of all crashes within 150 feet of the subject intersection. The following data table depicts the Naive Before and After Analysis for the above information. Please note that Frontal Impact and Rear End Crashes were the target crashes for the applied countermeasures. Frontal Impact Crash types are as follows: Left turn, same roadway; Left turn, different roadways; Right turn, same roadway; Right turn, different roadways; Head on; and Angle. Rear End Crash types are as follows: Rear end, slow or stop and Rear end, turn.

<u>Treatment Information</u>			
	<b>Before</b>	<b>After</b>	<b>Percent Reduction (-) Percent Increase (+)</b>
Total crashes	25	33	32.0
Total Severity Index	8.5	4.4	-48.5
Volume	7900	7600	-3.8
<u>Treatment Injury Crashes</u>			
	<b>Before</b>	<b>After</b>	<b>Percent Reduction (-) Percent Increase (+)</b>
Fatal	0	0	0.0
Class A	1	0	-100.0
Class B	2	1	-50.0
Class C	13	14	7.7
Property Damage Only	9	18	100.0

Table 1.

The naive before and after analysis at the treatment location resulted in a 32 percent increase in Total Crashes and a 4 percent decrease in Average Daily Traffic (ADT). The Treatment Injuries resulted in a 100 percent decrease for Class A, a 50 percent decrease for Class B, an 8 percent increase for Class C, and a 100 percent increase for Property Damage Only crashes.

<u>Target Crashes</u>			
	<b>Before</b>	<b>After</b>	<b>Percent Reduction (-) Percent Increase (+)</b>
Frontal Impact Crashes	16	28	75.0
Frontal Severity Index	10.8	4.7	-56.6
Rear End Crashes	9	4	-55.6
Rear End Severity Index	4.29	2.85	-33.6
<u>Frontal Injury Crashes</u>			
	<b>Before</b>	<b>After</b>	<b>Percent Reduction (-) Percent Increase (+)</b>
Fatal	0	0	0.0
Class A	1	0	-100.0
Class B	2	1	-50.0
Class C	9	13	44.4
Property Damage Only	4	14	250.0
<u>Rear End Injury Crashes</u>			
	<b>Before</b>	<b>After</b>	<b>Percent Reduction (-) Percent Increase (+)</b>
Fatal	0	0	0.0
Class A	0	0	0.0
Class B	0	0	0.0
Class C	4	1	-75.0
Property Damage Only	5	3	-40.0

Table 2.

The Frontal Injury Crashes resulted in a 100 percent decrease for Class A, a 50 percent decrease for Class B, a 44 percent increase for Class C, and a 250 percent increase for Property Damage Only crashes. The Rear End Injury Crashes resulted in a 75 percent decrease for Class C and a 40 percent decrease for Property Damage Only crashes. The before period ADT year was 1996 and the after period ADT year was 2002.

## Results and Discussion

The naive before and after analysis involving the comparison of treatment actual before data versus treatment actual after data resulted in a 32 percent increase in Total Crashes, a 75 percent increase in Frontal Impact Crashes, and a 56 percent decrease in Rear End Crashes. The summary results above demonstrate that the treatment location appears to have had an increase in the number of Total Crashes, an increase in the number of Frontal Impact Crashes, and a decrease in the number of Rear End Crashes from the before to the after period.

Referencing the collision diagrams and Table 2 it shows the problem of rear end collisions was addressed and decreased with the installation of left turn lanes along SR 1001. However, the tables and diagrams show an increase in frontal impact crashes (southbound and eastbound combination).

During the field investigation it was noted that some vehicles traveling on SR 1001 seemed to disregard the intersection ahead (with a 35 mph advisory speed plate) warning sign and maintain their speeds through the intersection. The added left turn lanes may have given vehicles traveling SR 1001 a false sense of security. The drivers may feel they can maintain speed through the intersection without having to slow down for turning vehicles in their lane.

Through observation, vehicles that were attempting a maneuver from SR 1146 eastbound stopped a



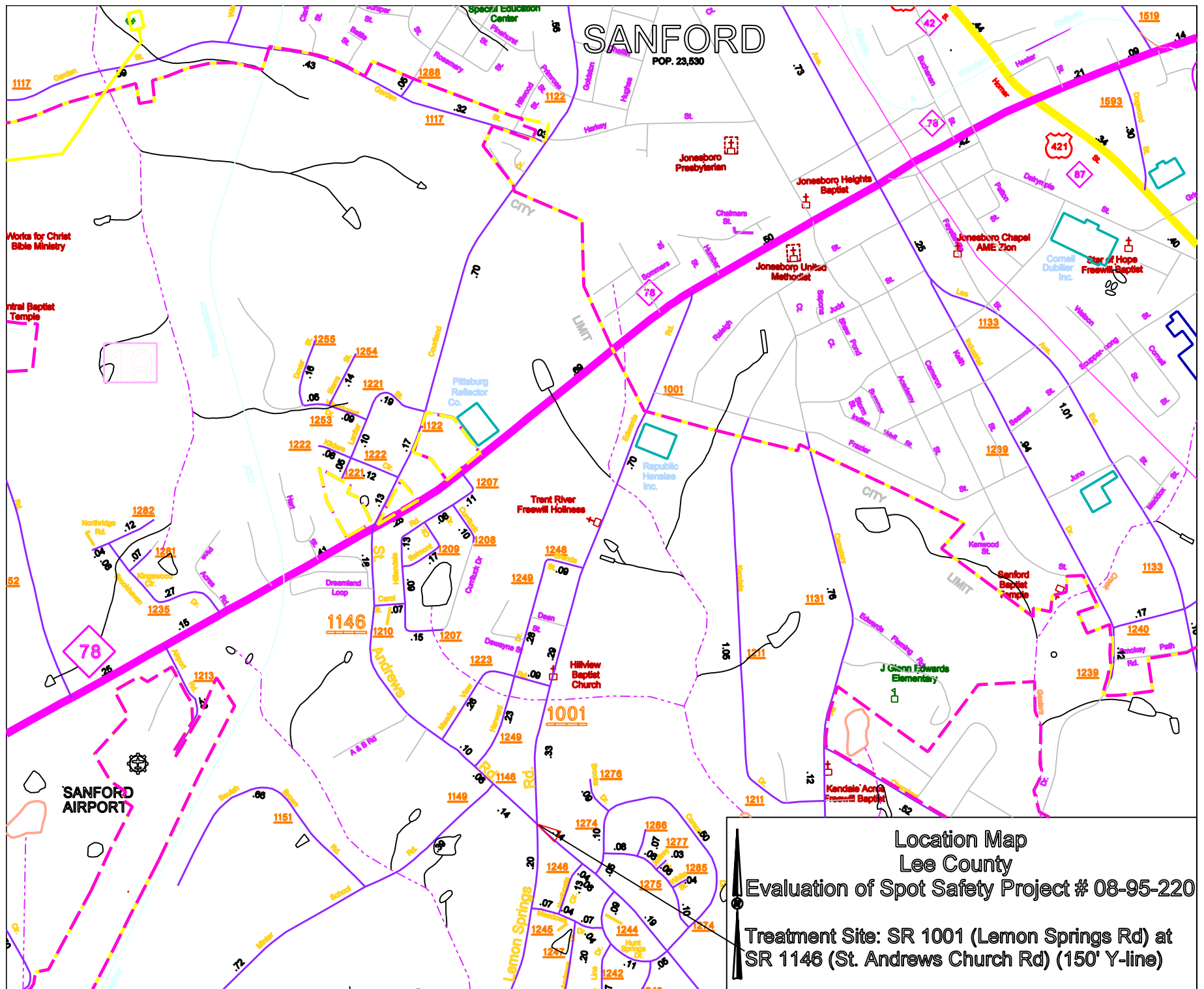
Picture 1.

distance of 10 to 15 feet away from SR 1001 (Picture 1). Since the cross-section was already increased by one lane, a vehicle stopping this far from the intersection may unknowingly add another travel lane to cross leaving it exposed in the intersection for a longer period of time.

While driving along SR 1001 it was observed that dashed white lines existed at other intersections along the route to delineate the edge of the travel lane. This may help drivers determine a proper stopping distance to allow for safer crossing of SR 1001 if the dashed lines were placed at the treatment intersection.

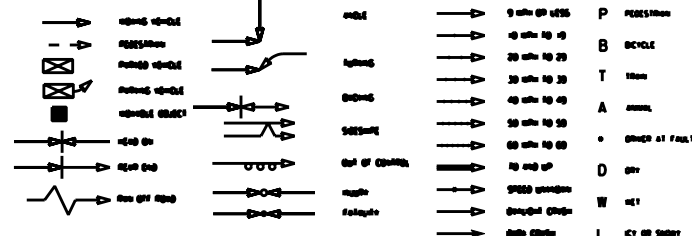
This location was on the statewide HSIP Potentially Hazardous Intersection list ranking as number 1885 in 2003 and 2166 in 2005 for the I-1 warrant.


As the Safety Evaluation Group completes additional spot safety reviews for this type of countermeasure, we will be able to provide objective and definite information regarding actual crash reduction factors for this type of intersection.



February 1, 1994  
(5 years)

SR 1001 (Lemon Springs Rd)  
55 mph



TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT		COLLISION DIAGRAM	
SAFETY LIGHT		SAFETY SIGNALS	
IMPROVEMENT PROGRAM		MANAGEMENT AND SUPPORT	
		DIVISION _____ AREA _____ STUDY PERIOD: 2/20/99 TO 12/31/99 DISTANCE: _____ T-NAME: 00 FT ANALYSIS PREPARED BY: S. COMBODD DIAGRAM PREPARED BY: S. COMBODD DIAGRAM REVIEWED BY: _____	
SAFETY EVALUATION		TRAFFIC SAFETY	
BEFORE FLASHER AND LEFT-TURN LANE INSTALLATION		SCALE: NOT TO SCALE DATE: MARCH 2000 AS SHOWN:	



Lee County  
Treatment Site - TotalCrashes  
After Period  
March 1, 2000 - December 31, 2005  
(5 years 10 months)

SR 1001 (Lemon Springs Rd)  
55 mph

SR 1146 (St. Andrews Church Rd)  
45 mph

STOP

STOP

Standard Flasher

**LEGEND**

Vehicle Symbols: P (Passenger Car), B (Bicycle), T (Truck), A (Animal), D (Driver), W (Witness), I (Other)

Crash Symbols: Rear End, Side Impact, Head On, etc.

Vehicle Position Symbols: 90° left turn, 90° right turn, etc.

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT  
STUDY PERIOD: 3/1/2000 TO 12/31/2005  
PREPARED BY: S. COOPER  
N.C. DEPARTMENT of TRANSPORTATION  
DIVISION of HIGHWAYS  
TRAFFIC ENGINEERING AND SAFETY  
SYSTEMS BRANCH

